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AUTHOR Ramasamy, Rangasamy; van der Jagt, Johan W.; Jacobs, Roy L.; Ghose, Chhanda; Lindsey, Jimmy D.

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ABSTRACT

This study was designed to determine whether a sample of preservice teachers had different brain hemisphere processing modes, learning styles, environmental preferences, and course-related behaviors. The study population was 90 students enrolled in an undergraduate introductory special education course. Forty-four of the students were selected to participate using a systematic random sampling procedure. Between- and within-subject designs were used to conduct the study. Dependent variables included findings from the subjects' Hemispheric Mode Indicator, Learning Style Inventory, and Productivity Environmental Preference Survey, and selected responses on a four-part questionnaire. Data analysis indicated that participants had different hemisphericity modes and preferred left and right processing. Their hemisphericity was associated with their predominant geographic area (urbanites preferred right mode processing, while suburbanites preferred left). Participants also had different learning styles and tended to be assimilators, accommodators, and convergers, but their learning styles were not associated with gender, race, predominant geographic area, laterality, or major. Participants had different environmental preferences (e.g., noise level) which were affected by gender, race, and laterality. Participants indicated that they had selected course-related behaviors or perceptions for listening, notetaking, time management, reading in the content, and studying. (SM)

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Hemisphericity Modes, Learning Styles, and Environmental Preferences of Students in an "Introduction to Special Education" Course

Display Session

Conducted at the

MidSouth Educational Research Association (MSERA) Conference

Point Clear, Alabama

by

Rangasamy Ramasamy, Ph.D.
Florida Atlantic University

Johan W. van der Jagt, Ph.D.
University of West Alabama

Roy L. Jacobs, Ph.D.
Southern University – Baton Rouge

Chhanda Ghose, Ph.D.
Southern University - Baton Rouge

Jimmy D. Lindsey, Ph.D.
Southern University - Baton Rouge)

November 18, 1999

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R. Ramasamy

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ABSTRACT

It was the purpose of this study to determine if a selected sample of preservice teachers had different brain hemispheric processing modes, learning styles, environmental preferences, and course-related behaviors. The population for this study was 90 students enrolled in an undergraduate introductory special education course at a doctoral level university in Florida. Forty-four (44) of the students were selected using a systematic random sampling procedure to participate as subjects. Between- (e.g., Gender, Race, Predominant Geographic Area, Laterality, and Major) and within-subjects (e.g., PEPS Environmental Preferences) designs were used to conduct the study. Dependent variables included the subjects' Hemispheric Mode Indicator, Learning Style Inventory, and Productivity Environmental Preference Survey findings and selected responses on a four-part questionnaire. SPSS/PC+ 7.5 descriptive and inferential statistical procedures were used to analyze the data. Null hypotheses were tested at the .05 alpha level.

Results indicated that subjects had different hemisphericity modes, preferred left and right processing, and their hemisphericity was associated with their predominant geographic area (urbanites preferred right mode processing while suburbanites preferred left). Subjects also had different learning styles, tended to be assimilators, accommodators, and convergers, but their learning styles were not associated with their gender, race, predominant geographic area, laterality, and major. Subjects had different environmental preferences (e.g., noise level), and gender, race, and laterality affected these preferences. Finally, subjects indicated that they had selected course-related behaviors (e.g., notetaking).

Specific findings, limitations of the study, and recommendations for future research will be presented.

ABSTRACT

It was the purpose of this study to determine if a selected sample of preservice teachers had different brain hemispheric processing modes, learning styles, environmental preferences, and course-related behaviors. The population for this study was 90 students enrolled in an undergraduate introductory special education course at a doctoral level university in Florida. Forty-four (44) of the students were selected using a systematic random sampling procedure to participate as subjects. Between- (e.g., Gender, Race, Predominant Geographic Area, Laterality, and Major) and within-subjects (e.g., PEPS Environmental Preferences) designs were used to conduct the study. Dependent variables included the subjects' Hemispheric Mode Indicator, Learning Style Inventory, and Productivity Environmental Preference Survey findings and selected responses on a four-part questionnaire. SPSS/PC+ 7.5 descriptive and inferential statistical procedures were used to analyze the data. Null hypotheses were tested at the .05 alpha level.

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Specific findings, limitations of the study, and recommendations for future research will be presented.

General Research Questions Guiding the Study

Brain Hemisphericity

Do students enrolled in an "Introduction to Special Education" course have different preferences for hemispheric mode processing (e.g., right, left, or whole brain)?

Are their preferred hemispheric processing modes affected by or associated with their gender, race, geographic area, major, rank, or overall laterality?

Learning Styles

Do students enrolled in an "Introduction to Special Education" course have different learning styles (e.g., accommodator, diverger, converger, and assimilator)?

Are their learning styles affected by or associated with their gender, race, geographic area, major, rank, or overall laterality?

Do these students have different learning style axis percentiles (e.g., AE-RO Active-Experimentation to Reflective Observation and AC-CE Abstract Conceptualization to Concrete Experience)? Does their gender, race, geographic area, major, rank, or laterality affect their axis percentiles?

Environmental Preferences

Do students enrolled in an "Introduction to Special Education" course have different environmental preferences that affect their learning (e.g., Noise Level -Prefers Quiet, No Preference, or Prefers Sound)?

Are their environmental preferences affected or related to their gender, race, geographic area, major, rank, or overall laterality?

Course-Related Behaviors

Do students enrolled in an "Introduction to Special Education" course have different lecture and note taking behaviors? Time management behaviors? Reading in he content behaviors? Studying for test behaviors?

Method

Subjects

Eighty-nine students enrolled in an undergraduate "Introduction to Special Education" course at a doctoral level university in Florida served as the population for this study. A systematic-random sampling procedure described by Ary, Jacobs, and Razivieh (1996) was used to select 44 of the above students to participate as subjects (k = 2). Forty-one of the selected students agreed to participate and completed one or more of the instruments. Table 1 presents these individuals' gender, race, predominant geographic area, major, rank, and laterality. With respect to the special education majors, the majority were female (n = 10), white (n = 7), suburbanites (n = 6), juniors (n = 8), and right handed (n = 7).

Research Design and Analyses

Between- and within-subject designs were used to conduct this study (Gravetter & Wallnau, 1996). The between-subject variables were gender, race, predominant geographic area, major, rank, and laterality. The within-subject factor was the Productivity Environmental Preference Survey (PEPS) subscales (20 environmental preferences). The dependent measures secured and processed for this study were the subjects' McCarthy's (1986) Hemispheric Mode Indicator preferred processing modes (e.g., right, left, and whole), Kolb's (1985) Learning Style Inventory grid types and axis percentiles, and Dunn, Dunn, and Price's (1993) PEPS 20 subscale classifications and standard scores (environmental preferences). The 41 subjects' general characteristics, laterality, and/or course-related behaviors were obtained by a five-part questionnaire.

Descriptive statistics (e.g., central tendency and variability) and inferential procedures (e.g., Analysis of Variance, repeated measures, chi square, Wilcoxon Z, and Krushal-Wallis) from the SPSS 7.5 statistical package were used to analyze the data (SPSS base 7.0, 1996). Basic assumptions for the nonparametric and parametric procedures as recommended by Heiman (1996) were met, and Duncan-Multiple Range Tests were used to separate significant mean scores. A null hypothesis was tested for each analysis, and the criterion for significance was a .05 probability level.

Instruments

Three commercial inventories and a four-part questionnaire were administered during this study. The commercial inventories included McCarthy's (1986) Hemispheric Mode Indicator (HMI), Kolb's (1985) Learning Style Inventory (LSI), and Dunn et al.'s (1993) Productivity Environmental Preference Survey (PEPS). A four-part questionnaire was developed and validated using a modified Delphi procedure to secure pertinent subject information. Part I, General Information, secured demographic and academic information such as gender, race, predominant geographic area, major,

and rank. Part II, Laterality Concepts, used nine items to ascertain specific hand, eye, and leg or foot preferences. Part III, Course-Related Concepts, consisted of 65 items and used a four-point Likert scale anchored by "Never to always" to determine course-related behaviors or strategies- Note taking, Time Management, Reading in Content, and Studying for a Test. Part IV, Student-Athletes' Study Program, Hall, or Table, used 20 items to secure Athletic Department study-hall behaviors and perceptions. Subjects in this study did not complete Part IV.

General Procedures

Four general procedures were used to conduct this study. First, 41 subjects were identified and agreed to participate in the study. One of the researchers met with the subjects, discussed the purposes of the study, and answered the subjects' questions. Second, the subjects completed at least one of the inventories or the questionnaire. Third, the subjects' commercial inventories and questionnaires were hand- or machine-scored and coded for statistical purposes. Fourth, the SPSS 7.5 data management procedure was used to create and store a data set, and descriptive and inferential statistical modules were used to analyze subjects' responses.

Results

Brain Hemisphericity

The subjects' HMI processing mode preferences overall and by gender, race, geographic area, major, rank, and laterality are presented in Table 2. Chi-square goodness-of-fit findings delineated in Table 3 suggested that the subjects have different preferences for hemispheric mode processing (e.g., χ^2 = 12.17, $p < .01$ - tend to prefer left and right brain processing modes). Chi-square test of difference findings revealed that subjects' predominant geographic area (Urban vs. Other) was associated with their preferred hemispheric processing modes (e.g., χ^2 = 7.22, $p < .03$ – subjects from an urban area preferred right hemispheric processing while those from other suburban and rural areas preferred left hemispheric processing). However, there were no significant associations between the subjects' gender, major, rank, and laterality and their preferred hemispheric processing modes (see Table 3).

Learning Styles

The subjects' Kolb LSI learning styles overall and by gender, race, geographic area, major, rank, and laterality are presented in Table 4. Although the subjects overall were found to be assimilators (n = 14), accommodators (n = 8), and convergers (n = 8), chi-square goodness-of-fit findings revealed no significant differences in the subjects' Kolb learning style observed and expected frequencies (see Table 5 - χ^2 = 4.89, $p < .18$). Test of difference findings also revealed that there were no significant associations between subjects' gender, geographic area, major, rank, and laterality and their Kolb learning styles (see Table 5).

Table 6 presents the subjects' Kolb LSI AE-RO and AC-CE percentile medians and ranges overall and by gender, geographic area, major, rank, and laterality. Gender, race, geographic area, major, and laterality did not affect subjects' AE-RO and AC-CE percentile scores (see Table 7 Wilcoxon Z and Krushal-Wallis statistical findings).

Environmental Preferences

The subjects' overall PEPS standard score means, standard deviations, and ranges and One-Sample t-Test findings are presented in Table 8. Subjects' mean scores differed from the norming sample on three PEPS subscales – Persistence, Auditory, and Intake. A one-way ANOVA repeated measures analysis (PEPS Subscales or Environmental Preferences - 1 to 20) revealed that the subjects had different PEPS environmental preference mean standard scores – $F(19,684) = 3.48$, $p < .01$. Table 9 presents one-way ANOVA findings by gender, race, geographic area, major, rank, and laterality. Although geographic area, major, and rank did not affect the subjects' PEPS environmental preference standard mean scores, subjects had different PEPS mean scores by gender, race, and laterality did. With respect to gender males had higher PEPS Persistence and Responsibility mean standard scores than females (58.67vs. 52.03 and 57.67 vs. 49.94) but females had the higher PEPS Structure standard mean score (52.00 vs. 59.55). With respect to race: (a) the PEPS Noise standard mean score of white subjects was significantly higher than the Noise mean scores of black and other subjects (55.86 vs. 41.6 and 45.33), but there was no statistical difference in the black and other subjects' Noise mean scores; and (b), the PEPS Intake standard mean scores of white and other subjects were significantly higher than the Intake mean score of black subjects (55.91 and 58.67 vs. 46.16), but there was no

PEPS Structure standard mean score of subjects with left laterality was significantly higher than the mean score of those subjects with right laterality (59.70 vs. 47.00), but the Structure mean scores of subjects with left and both laterality (59.70 vs. 53.50) and with right and both laterality (47.00 vs. 53.50) were statistically similar; (b) subjects' PEPS Alone/Peers standard mean scores by laterality (Left, Right, or Both) could not be separated using Duncan Multiple-Range procedures due to cell n's – mean scores 50.13 vs. 37.50 vs. 40.00 respectively; (c) the PEPS Visual standard mean score of subjects with left laterality was significantly higher than the mean score of those subjects with right laterality (50.57 vs. 37.75), but the Structure mean scores of subjects with left and both laterality (50.57 vs. 47.00) and with right and both laterality (37.75 vs. 47.00) were statistically similar; (d) the PEPS Time of Day standard mean score of subjects with right laterality was significantly higher than the mean score of those subjects with both laterality (60.50 vs. 45.00), but the Time of Day mean scores of subjects with right and left and laterality (60.50 vs. 48.09) and with left and both laterality (48.09 vs. 45.00) were statistically similar; (e) the PEPS Afternoon standard mean scores of subjects with left and both laterality were significantly higher than the mean score of subjects with right laterality (54.30 and 58.00 vs. 39.50), but there was no statistical difference in the Afternoon mean scores of subjects with left and both laterality; and (f), the PEPS Mobility standard mean score of subjects with both laterality was significantly higher than the mean score of those subjects with right laterality (57.00 vs. 40.50), but the Mobility mean scores of subjects with left and right laterality (52.91 vs. 40.50) and with left and both laterality (52.91 vs. 57.00) were statistically similar.

Subjects' PEPS environmental preferences by categories and related chi-square goodness-of-fit findings are presented in Table 10. Observed frequencies were different than expected in 18 PEPS categories suggesting that subjects tend to have preferences for less or more environmental factors. For example, and with respect to noise, eight subjects preferred quiet when studying, noise was not a factor for 21 subjects, and two subjects preferred noise in their study environment. Also, and with respect to temperature, 12 subjects preferred a cool environment for studying, temperature was not a factor for 17 subjects, and two subjects preferred a study environment that was warm.

Course-Related Behaviors

Tables 11 through 15 present the subjects' notetaking, time management, reading in the content, studying for test, and study habit behaviors (i.e., four-point Likert Responses anchored by "Never" to "Always"). With respect to listening and notetaking, it appears that the subjects listen for and organize major specific lecture information and prefer using outlines with complete sentences and keywords and other formats to take notes. With respect to time management, the subjects have long-, intermediate-, and short-term goals written and prioritized and remember important assignment dates, but they do not schedule time for studying lecture notes or for reading assignments. With respect to reading in the content, the subjects survey materials to be read, use questions during reading to promote understanding, and highlight or write down important information while reading. With respect to studying for a test, the subjects reported that it was important to study course-related material to prepare for tests and that they tend to use the same behaviors for essay and objective tests (e.g., re-read materials, connect themes, and "ask" questions that may be on the test). With respect to study habits, the subjects tend to study alone, prefer quiet settings, and use different intervals for studying and taking breaks.

Discussion

The general findings of this study suggest that preservice teachers in an "Introduction to Special Education" course as a group prefer left (n = 20, 59%) or right (n = 13, 33%) hemispheric processing modes (χ^2= 12.17, $p < .01$), and their predominant geographic area (Urban vs. Other) was associated with their preferred hemispheric processing modes (e.g., $\chi^2 = 7.22$, $p < .03$ – subjects from an urban area preferred right hemispheric processing while those from other areas - suburban and rural - preferred left hemispheric processing). Faculty members responsible for introductory special education courses should maximize learning experiences by using effective teaching-learning activities that "tap" both right and left hemispheric processing modes. The preservice teachers also have different learning styles – 8 (23%), 5 (14%), 8 (23%), and 14 (40%) respectively were accommodators, divergers, convergers or assimilators, but their learning styles were not associated with their gender, race, geographic area, major, rank, or overall laterality. The preservice teachers' gender, race, geographic area, major, and laterality did not affect their Kolb AE-RO and AC-CE percentile scores. Faculty members responsible for introductory special education courses should use teaching-learning activities that "tap" all learning styles (accommodators, divergers, convergers, and assimilators).

The PEPS findings also suggest that the preservice teachers as a group have different environmental preferences (i.e., they prefer "more" or "less" specific environmental factors, such as persistence, structure, different procedures, and kinesthetics). Gender, race, and overall laterality affected their preferences. Faculty members should consider students' gender when addressing persistence, responsibility, and structure. They should also consider the students' race when addressing noise level and intake teaching-learning issues. Faculty members should consider students' overall laterality when addressing structure, grouping (alone/peers), visual, time of day, afternoon, and mobility teaching-learning issues.

Finally, these preservice teachers had specific course-related behaviors or perceptions for listening, notetaking, time management, reading in the content, and studying behaviors and perceptions. Faculty members instructing advanced courses in education where possible should match "teaching activities" with their students' "course-related learning behaviors or perceptions."

Limitations

This study had a number of limitations. The primary limitations were:

1. The study was limited to 89 preservice teachers enrolled in an undergraduate "Introduction to Special Education" course at a doctoral level university in Florida. Forty-one of the 44 students selected to participate in this study agreed to serve as subjects.

2. Subjects did not complete all inventory or questionnaire items, and this limited the size of the "N's" for selected data collection and analyses.

Recommendations for Future Studies

It is recommended that future studies:

1. Increase the size and diversity of the sample participating. Expanding accessible population to include African-American and "other race" preservice teachers enrolled in an introductory course of special education at more than one university should also be considered.

2 Use a proportional stratified-random sampling procedure to select preservice teachers enrolled in an introductory special education courses. Strata could include gender, race, predominant geographic area, and major among other general and academic characteristics.

3. Adopt a monitoring technique to ensure that all inventory and questionnaire items are answered. The use of an interview procedure could reduce the number of unanswered questionnaire items.

4. Revise Part III of the questionnaire to include "student- or course-related" scenarios and open-ended items. These scenarios and open-ended items could improve the quality and specificity of the subjects' responses.

Table 1

Subjects' General and Academic Characteristics (N = 41)

Variable	Condition	Number n	_%
Gender	Male	7	17.1
	Female	34	82.9
Race	White	28	70.0
	Black	6	15.0
	Other	6	15.0
	Hispanic (1)		
	Asian-American (3)		
	Native American (2)		-
Predominant Geographic Area	Urban	17	44.7
	Suburban	20	52.6
	Rural	1	2.7
Major	Special Education	11	26.8
	Elementary Education	26	63.4
	Other	4	9.8
	Early Childhood (3)		
	Secondary Education (1)		
Rank	Junior	18	45.0
	Senior	14	35.0
	Other	8	20.0
Overall Laterality	Right	26	78.8
	Left	4	12.1
	Both	3	9.1

Table 2

Subjects' McCarthy Preferred Hemispheric Processing Mode Overall and by General and Academic Characteristics

Variable	Condition	Preferred Hemispheric Processing Mode		
		Right	Left	Whole
Overall		13	23	3
Gender	Male	1	5	1
	Female	12	15	2
Predominant Geographic Area	Urban	9	7	0
	Suburban	3	11	3
	Rural	0	1	0
Major	Special Education	4	8	1
	Elementary Education	7	12	1
	Other	0	3	0
Rank	Junior	6	10	2
	Senior	6	4	1
	Other	1	5	0
Overall Laterality	Right	8	13	2
	Left	2	1	1
	Both	0	3	0

Table 3

Summary of Chi-Square Goodness-of-Fit Overall Preferred Hemispheric Processing Mode Finding and Tests of Difference for Subjects' Preferred Hemispheric Processing Mode and General and Academic Characteristics Findings

Analyses / Factors	Chi-Square	df	p
Overall – Goodness-of-Fit	12.17	2	.01
Gender and HMI Hemispheric Mode Processing Mode Preference	1.91	2	.39
Race and HMI Processing Mode Processing Preference	0.16	2	.92
Predominant Geographic Area and HMI Hemispheric Mode Processing Preference	7.22	4	.03
Major and HMI Processing Mode Processing Preference	1.51	4	.74
Rank and HMI Processing Mode Processing Preference	3.89	2	.47
Overall Laterality and HMI Processing Mode Processing Preference	1.35	2	.51

For purposes of analyses:

- Race Recoded to "White and Minority"
- Predominant Geographic Area Recoded to "Urban and Other"
- Major Recoded to "Special Education and Other"
- Laterality Recoded to "Right and Other"

Table 4

Subjects' Kolb Overall Learning Styles and Kolb Learning Styles by General and Academic Characteristics

Variable	Condition	Kolb Learning Style * AC	DI	CO	AS
Overall		8	5	8	14
Gender	Male	3	1	1	1
	Female	5	4	7	13
Race	White	4	4	6	8
	Black	2	0	1	4
	Other	2	1	1	1
Predominant Geographic Area	Urban	3	2	4	7
	Suburban	5	2	4	5
	Rural	0	1	0	0
Major	Special Education	2	2	1	6
	Elementary Education	6	3	7	7
	Other	0	0	0	1
Rank	Junior	4	2	4	7
	Senior	3	2	3	4
	Other	1	1	1	3
Overall Laterality	Right	4	4	4	0
	Left	0	0	3	1
	Both	2	1	0	0

*** AC – Accommodator, DI – Diverger, CO – Converger, AS – Assimilator**

Table 5

Summary of Chi-Square Goodness-of-Fit Overall Finding and Tests of Difference Findings for Gender, Race, Predominant Geographic Area, Major, Rank, and Laterality and Kolb Learning Styles (e.g., AC, DI, CO, and AS)

Analyses / Factors	Chi-Square	df	p
Overall – Goodness-of-Fit	4.89	3	.18
Gender and Kolb Learning Style	3.47	3	.33
Race and Kolb Learning Style	1.70	3	.64
Predominant Geographic Area and Kolb Learning Style	1.00	3	.80
Major and Kolb Learning Style	2.50	3	.48
Rank and Kolb Learning Style	0.69	6	.99
Overall Laterality and Kolb Learning Style	3.84	3	.28

For purposes of analyses:

- Race Recoded to "White and Minority"
- Predominant Geographic Area Recoded to "Urban and Other"
- Major Recoded to "Special Education and Other"
- Laterality Recoded to "Right and Other"

Table 6

Subjects' Kolb Overall AE-RO and AC-CE Percentile Medians and Ranges and by Gender, Race, Predominant Geographic Area, Major, Rank, and Laterality

Variable	Condition	AE-RO Percentile Mdn	AE-RO Percentile R	AC-CE Percentile Mdn	AC-CE Percentile R
Overall		54.0	2 – 100	54.0	3 – 94
Gender	Male	57.0	44–100	59.0	24 – 84
	Female	56.0	2 – 100	49.5	3 - 94
Race	White	59.01	23-100	56.5	10 – 94
	Black	68.0	2–100	53.0	12 – 89
	Other	66.0	35 – 82	58.0	12 – 65
Predominant Geo-Graphic Area	Urban	62.5	27 – 98	46.5	10 - 94
	Suburban	61.5	2 – 100	59.0	12 – 89
	Rural (n = 1)	N/A	N/A	N/A	N/A
Major	Elementary Education	61.0	29 – 99	53.0	12 – 82
	Secondary Education	52.0	2 – 100	58.0	10 – 94
	Other	56.5	15 - 98	20.5	3 - 38
Rank	Junior	62.0	2 – 100	55.0	12 – 89
	Senior	58.5	23-100	55.0	10 – 94
	Other	50.0	19 – 75	56.5	24 – 84
Overall Laterality	Right	56.0	2 – 95	46.5	12 – 89
	Left	47.0	27–100	60.0	12 – 94
	Both	97.0	44-100	58.0	58 - 67

* AE-RO (Active Experimentation – Reflective Observation)

* AC-CE (Abstract Conceptualization – Concrete Experience)

Table 7

Summary of Findings for Wilcoxon Rank Sums Test for Independent Samples and Kruskal-Wallis H Tests for Independent Samples for Subjects' Kolb Learning Styles AE-RO and AC-CE Percentile Scores

Analyses/Factors	Percentile Score	Statistic	p
Wilcoxon Z / Gender	AE-RO	Z = -0.85	.40
Wilcoxon Z / Gender	AC-CE	Z = -1.04	.30
Krushal-Wallis / Race	AE-RO	$\chi^2 = 0.67$	.71
Krushal-Wallis / Race	AC-CE	$\chi^2 = 0.38$	.83
Wilcoxon Z / Geographic Area	AE-RO	$\chi^2 = 0.26$	.79
Wilcoxon Z / Geographic Area	AC-CE	$\chi^2 = 0.94$	.35
Kruskal-Wallis / Major	AE-RO	$\chi^2 = 0.43$	.67
Kruskal-Wallis / Major	AC-CE	$\chi^2 = 0.31$	.76
Krushal-Wallis / Rank	AE-RO	$\chi^2 = 1.26$	.53
Krushal-Wallis / Rank	AC-CE	$\chi^2 = 0.59$	.71
Krushal-Wallis / Overall Laterality	AE-RO	$\chi^2 = 2.00$	.37
Krushal-Wallis / Overall Laterality	AC-CE	$\chi^2 = 0.97$	.62

- AE-RO (Active Experimentation – Reflective Observation)
- AC-CE (Abstract Conceptualization – Concrete Experience)
- Predominant Geographic Area Recoded to "Urban and Other"

Table 8

Subjects' Dunn et al. PEPS Factor Standard Score Overall Means and Standard Deviations and One-Sample t-Test Findings

PEPS Factor	Mean	SD	t(30)	p
Noise Level	50.89	10.06	0.54	.59
Light	51.89	9.22	1.25	.22
Temperature	48.62	8.27	-1.01	.32
Design	52.14	10.07	1.29	.21
Motivation	50.70	8.66	0.49	.63
Persistence	53.11	7.66	2.47	.02
Responsibility	51.19	8.37	0.86	.39
Structure	58.32	8.13	6.23	.01
Alone/Peers	47.65	10.07	-1.42	.16
Authority Figures	52.32	9.12	1.55	.13
Several Ways	48.84	9.13	-0.77	.44
Auditory	55.16	8.69	3.61	.01
Visual	48.24	7.71	-1.39	.17
Tactile	51.97	10.39	1.16	.26
Kinesthetic	51.70	7.23	1.43	.16
Intake	53.92	9.64	2.47	.02
Time of Day	48.27	8.85	-1.19	.24
Late Morning	49.30	7.56	-0.57	.58
Afternoon	52.59	11.08	1.42	.16
Mobility	51.92	9.74	1.20	.24

* PEPS Factor Mean = 50 and SD = 10

Table 9

Summary of ANOVA Findings for Subjects' Dunn et al. PEPS Factor Standard Scores by Gender, Race, Predominant Geographic Area, Major, Rank, and Laterality

	Gender		Race		Geographic Area		Major		Rank		Overall Laterality	
	df (1,35)		df (2,32)		df (1,31)		df (2,34)		df (2,33)		df (1,28)	
PEPS Factor	F	p	F	p	F	p	F	p	F	p	F	P
Noise Level	2.03	NS	10.39	.01	0.02	NS	0.28	NS	0.84	NS	1.52	NS
Light	0.03	NS	0.04	NS	0.02	NS	0.21	NS	0.66	NS	0.05	NS
Temperature	0.25	NS	0.36	NS	0.42	NS	3.06	NS	0.05	NS	0.04	NS
Design	0.24	NS	0.55	NS	0.00	NS	0.55	NS	0.23	NS	0.11	NS
Motivation	1.52	NS	2.60	NS	1.88	NS	1.61	NS	1.45	NS	0.82	NS
Persistence	4.10	.05	1.70	NS	0.17	NS	0.12	NS	0.68	NS	1.04	NS
Responsibility	4.73	.04	2.86	NS	0.00	NS	0.22	NS	0.04	NS	1.11	NS
Structure	4.79	.04	2.66	NS	0.04	NS	0.68	NS	0.74	NS	4.94	.02
Alone/Peers	0.77	NS	0.44	NS	1.55	NS	0.60	NS	2.47	NS	3.92	.03
Authority Figures	0.77	NS	1.12	NS	0.00	NS	0.03	NS	1.23	NS	1.72	NS
Several Ways	0.40	NS	1.02	NS	0.39	NS	1.87	NS	0.28	NS	2.19	NS
Auditory	2.30	NS	0.05	NS	1.69	NS	2.28	NS	1.87	NS	0.62	NS
Visual	0.14	NS	1.25	NS	0.48	NS	0.58	NS	2.89	NS	6.67	.01
Tactile	1.05	NS	1.24	NS	0.13	NS	0.38	NS	0.15	NS	2.12	NS
Kinesthetic	0.19	NS	2.00	NS	3.92	NS	0.13	NS	0.21	NS	2.61	NS
Intake	0.44	NS	4.00	.03	1.84	NS	0.29	NS	1.81	NS	0.47	NS
Time of Day	2.44	NS	0.91	NS	1.43	NS	1.67	NS	0.13	NS	3.95	.03
Late Morning	0.70	NS	0.66	NS	0.01	NS	1.10	NS	1.50	NS	0.06	NS
Afternoon	0.39	NS	2.36	NS	0.09	NS	1.77	NS	0.51	NS	4.80	.02
Mobility	0.00	NS	0.66	NS	0.04	NS	0.24	NS	0.25	NS	3.33	.05

- Gender – Male and Female
- Race – White, Black, and Other
- Predominant Geographic Area – Urban and Other
- Major – Special Education, Elementary Education, and Other
- Rank – Junior, Senior, and Other
- Overall Laterality – Right, Left, and Both

Table 10

Subjects' Dunn et al. PEPS Environment Factors by Categories and Chi-Square (df = 2) Goodness-of-Fit Findings

Environmental Factor	Category 1	2	3	Goodness-of-Fit Analyses Chi-Square	p
Noise Level	8	21	2	18.26	.01
Light	10	13	8	1.23	.54
Temperature	12	17	2	11.29	.01
Design	5	24	2	27.55	.01
Motivation	3	23	5	23.48	.01
Persistence	2	24	5	27.55	.01
Responsibility	9	21	1	19.61	.01
Structure	2	16	13	10.52	.01
Alone/Peers	6	20	5	13.61	.01
Authority Figures	2	20	9	15.94	.01
Several Ways	12	17	2	11.29	.01
Auditory	2	13	16	10.52	.01
Visual	5	25	1	32.00	.01
Tactile	1	26	4	36.07	.01
Kinesthetic	2	25	4	31.42	.01
Intake	2	9	20	15.94	.01
Time of Day	16	15	0	0.03	.86
Late Morning	9	21	1	19.61	.01
Afternoon	1	13	17	13.42	.01
Mobility	3	20	7	13.80	.01

Table 11

Subjects' Listening and Lecture and Textbook Notetaking Responses – Never, Rarely, Frequently, Always

Listening or Notetaking Item	Number of Likert Responses 1	2	3	4
Listening to Lecture				
Listen first for the main point and then write it down	4	6	19	5
Listen first for the main point and some of the details and then write them down	1	13	15	5
Start writing as soon as the lecture begins and write so that I don't miss any details	11	14	6	3
Listen first to all the main points and details and then write down the main points and some details supporting the main points	4	14	12	4
Start writing but only write down the main points and some Details supporting the main point	12	13	7	2
Lecture Notetaking				
Usually write whole sentences	1	5	20	8
Usually write phrases	6	9	14	5
Usually write phrases and whole sentences	2	11	14	7
Usually outline using phrases as much as possible	13	13	6	1
Usually outline using complete sentences as much as possible	1	1	15	16
Usually write down key words as much as possible	3	6	14	10
Usually use a combination of key words, sentence, and phrases in non-outline form as much as possible	3	9	13	8

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Table 11 Continued

Usually use a combination of key words, sentences, and Phrases in outline form as much as possible	0	3	13	17
Try to make sure while I am writing that I will be able to Understand them after the lecture is over	5	11	12	5
Try to write down as much as I can and think I will be able to Figure out what they mean when I go over them after the Lecture	12	9	6	6
<u>Notetaking from Textbooks</u>				
Usually write whole sentences	2	8	15	8
Usually write phrases	2	15	12	4
Usually write phrases and whole sentences	11	14	7	1
Usually outline using phrases as much as possible	0	3	17	13
Usually outline using complete sentences as much as possible	2	10	14	7
Usually write down key words as much as possible	7	8	13	5
Usually use a combination of key words, sentence, and Phrases in non-outline form as much as possible	6	13	11	1
Usually use a combination of key words, sentences, and Phrases in outline form as much as possible				

Table 12

Subjects' Time Management Responses – Never, Rarely, Frequently, Always

Time Management Item	Number of Likert Responses 1	2	3	4
Scheduled times for studying lecture notes	8	13	11	1
Scheduled times for reading assignments	7	13	11	2
Scheduled times for writing assignments	6	7	17	3
Set goals to accomplish specific assignments and activities	0	4	13	16
Remember dates set to accomplish specific assignments and Goals	0	5	10	18
Have long term goals	0	3	7	23
Have intermediate goals	0	1	15	17
Have short term goals	0	1	11	21
Goals are written down in order of Priority	4	11	12	6
Consistently use scheduled times for studying and activities Regardless of other items of interest that may intercede	3	13	14	3

Table 13

Subjects' Reading in the Content Responses - Never, Rarely, Frequently, Always

Reading in the Content Item	Number of Likert Responses 1	2	3	4
When I read a textbook, I:				
Just start to read and continue reading until finished	1	20	9	3
Survey or look over what is to be read before reading	2	8	15	8
Ask factual questions before reading and look for answers from The passage	9	19	5	0
Ask factual questions during reading and look for answers from The passage	5	14	12	2
Ask factual questions after reading and look for answers from the passage	5	12	13	3
Ask questions during reading as to the meaning of the whole Passage and summarize its meaning	4	10	16	3
Underline or highlight important sentences, and/or parts of Complete paragraphs	1	3	12	17
Write down (or type on my computer) during my reading the Points I consider to be important	6	8	11	8
Write down (or type on my computer) after my reading the Points I consider to be important	7	8	13	5

Table 14

Subjects' Studying for Test Responses - Never, Rarely, Frequently, Always

Studying for Test Item	Number of Likert Responses 1	2	3	4
For test requiring essay-type responses, I:				
Study by re-reading the textbooks, hand-outs, and my notes so that I know all the most important facts	1	0	14	18
Study by re-reading the textbooks, hand-outs, and my notes and try to find important themes with supporting details	1	2	18	12
Study by re-reading the textbooks, hand-outs, and my notes to find connecting themes	1	4	18	10
Study by talking about the textbooks, hand-outs, and my notes with my "study" friends (or classmates)	7	13	8	5
Ask questions that I think the professor might ask in the test and write down the answers based on my material	5	12	13	3
Don't need to study my notes or books because I can remember everything I need to remember from my classes	24	7	2	0
For tests with "True and False" and multiple-choice items, I:				
Study by re-reading the textbooks, hand-outs, and my notes, so that I know all the most important facts	1	2	17	13
Study by re-reading the textbooks, hand-outs, and my notes, and try to find important themes with supporting details	1	5	19	8
Study by re-reading the textbooks, hand-outs, and my notes, to find connecting themes	2	7	17	7

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Table 14 Continued

Study by talking about the textbooks, hand-outs, and my notes, with my "study" friends (or classmates)	7	9	11	6
Ask questions that I think the professor might ask in the test and write down the answers based on my material	4	13	12	4
Don't need to study my notes or books because I can remember everything I need to remember from my classes	25	4	4	0

Table 15

Subjects' Study Habit Responses - Never, Rarely, Frequently, Always

Study Habit Item	Number of Likert Responses 1	2	3	4
I learn best when I:				
Study with other students	8	17	5	3
Study by myself	0	1	9	23
Have absolute quiet	2	6	13	12
Have some noise in the background	6	13	12	2
I study using:				
Ten to fifteen minute intervals and then take a short break	11	16	5	1
Twenty to twenty-five minute intervals and then take a short Break	4	14	13	2
Thirty to thirty-five minute intervals and then take a short break	6	13	12	2
One hour intervals and then take a short break	7	9	9	8
Two hours and then take a short break	14	9	9	1
Time intervals, think about he material I've studied during my Break, and continue studying new information after my break	5	11	14	3
Time intervals, don't think about he material I've studied during my break. When I return from my break, I try to remember the information from before my break	5	15	7	6